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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/510,482	04/19/2005	Yet-Ming Chiang	14952.0307	7450
27890 7590 03/04/2009 STEP TOE & JOHNSON LLP 1330 CONNECTICUT AVENUE, N.W. WASHINGTON, DC 20036				
EXAMINER				
HAIDER, SAIRA BANO				
ART UNIT		PAPER NUMBER		
1796				
MAIL DATE		DELIVERY MODE		
03/04/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/510,482

Applicant(s)

CHIANG ET AL.

Examiner

SAIRA HAIDER

Art Unit

1796

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/15/2008 has been entered.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1, 3-9, 11, 13, 15, 16, 18, 19, 21-25, 27 and 29-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Ruoff et al. (US 5,547,748) as evidenced by Valencia et al. (J. Phys. Chem.).
4. Ruoff discloses the encapsulation of metal carbides inside multilayered polyhedral shells of carbon (nanoencapsulates), the resulting nanoencapsulate materials have uses as composite materials (abstract).
5. Ruoff discloses a nanoencapsulate that comprises a metal carbide core and a clusters of single layer nanotubes arranged about the core, wherein the nanotubes extend radially outwards from the core, the core is approximately 28nm in diameter and the outer diameter (defined by the nanotubes) is approximately 90 nm (col. 10, lines 20-26).
6. Specifically, Ruoff disclose that the nanoencapsulates are characterized by an outer carbon shell of nested concentric layers and an inner core of metal (col. 1, lines 5-9). Ruoff discloses that nested carbon tubes have extended the dimensions and geometries of fullerenes into the nanometer

domain (col. 2, lines 16-20). Accordingly, it is clear that the nanotubes of the nanoencapsulate, are made of fullerenic carbon.

7. The nanoencapsulates comprise nested fullerenes (col. 7, lines 39-43). Ruoff discloses that the nanoencapsulates comprise a metal or metal carbide as the core material, wherein the core material fills or partially fills the innermost voids of the nanopolyhedral (col. 4, lines 10-14). Thus, it is clear that the carbon nanoparticle shell entirely covers the core material, hence meeting the claim limitation regarding the shell covering at least 50% of the surface of the core.

8. Based on the metal carbide core having a diameter of 28 nm and a clusters of single layer nanotubes arranged about the core forming an outer diameter of 90 nm, it is readily calculated that the nanoencapsulate is at least 2% by volume carbon nanoparticles (col. 10, lines 20-26).

9. Since the prior art discloses the identical chemical structures, the properties applicant discloses and/or claims (nanotubes are densely packed) are necessarily present. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The burden shifts to the applicant to show an unobvious difference. Note, that because the reference does not expressly disclose or address the properties of the claimed invention, does not mean that the properties are not inherently disclosed. Disclose the same compound(s) inherently discloses the corresponding properties. The references cannot possibly disclose or address all of the properties, but implicitly all of the properties are present.

10. In reference to the claim limitations which specify the intended use of the claimed particles, it is noted that the Ruoff reference discloses a variety of applications for the nanoencapsulates including applications in material science, chemistry, medicine and biotechnology (col. 10, lines 50-54). The statements in the preamble reciting the intended use of the claimed invention have been evaluated to determine whether the intended use results in a structural difference between the

claimed invention and the prior art, it is the examiners position that a structural difference does not exist. Specifically, the intended use of the core-shell particle in a composite abrasive particle, structurally reinforced composite, electrochemical storage medium or hydrogen storage medium fails to result in a structural difference between the claimed invention and the prior art. Thus, since the prior art structure is capable of performing the intended use, then it meets the claim. See MPEP § 2112.

11. In reference to the limitation regarding the chemical attachment of the carbon nanoparticle to at least a portion of a surface of the core, it is noted that this limitation is considered an inherent property of the claimed product. Since the prior art teaches the identical chemical structures (carbon nanoparticles with a core metal carbide), the properties applicant discloses and/or claims are necessarily present. *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The burden shifts to the applicant to show an unobvious difference.

12. The chemical attachment of the carbon nanoparticle to at least a portion of the metal carbide core is evidenced by the Valencia et al. reference. Valencia discloses that endohedral fullerenes encapsulated with metal carbides are chemically bonded via charge transfer from the metallic cluster (for example a metal carbide) to the carbon cage (abstract, Scheme 1). Wherein Ruoff recognizes that the nanoencapsulated is nested polyhedral shells, wherein the polyhedral particles are nested fullerenes (col. 7, lines 38-48). Accordingly, it is clear that the metal carbide encapsulated multilayered polyhedral shells of carbon disclosed by Ruoff possess the claimed chemical bond between the core and shell materials.

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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14. A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 2, 14, 17 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruoff et al. (US 5,547,748) in view of Ma et al. (Journal of Materials Science).

16. Claims 2, 14, 17 and 20, specify the metal carbide as silicon carbide, Ruoff discloses a variety of suitable core metal carbide materials, but fails to disclose silicon carbide. Thus attention is directed to the Ma et al. reference. Ma discloses carbon nanotubes-nano-SiC (silicon carbide) ceramic. Wherein nano-SiC powders and carbon nanotubes are combined to form a composite having increased bending strength and fracture toughness as compared to monolithic SiC ceramic. Ma recognizes that the CNT (carbon nanotubes) can feasibly be utilized as nano-size reinforcement in ceramics (abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to encapsulate silicon carbide in the nanoencapsulates of Ruoff in order to produce a reinforced SiC composite with improved bending strength and fracture toughness.

17.

18. Claims 10, 12, 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ruoff et al. (US 5,547,748).

19. The claims specify a metal or metal oxide coating on the carbon nanoparticles, Ruoff discloses derivatizing the surface of the nanoencapsulates by applying various compounds to the exterior of the nanoencapsulates (col. 11, lines 8-60). Wherein Ruoff fails to disclose metal or metal oxide compounds as suitable surface compounds, however, Ruoff discloses the use of iron oxide particles in floppy disks (col. 12, lines 18-24). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to coat the surface of the nanoencapsulates with a metal

oxide compound thus resulting in the formation of magnetic material suitable for use as magnetic recording media.

Response to Arguments

20. Applicant argues that the spiny structures of Ruoff relied on by the examiner are not necessarily nanotubes. Applicant has submitted an Affidavit in support of such argument. The examiner as thoroughly considered the declaration, arguments, and the Ruoff reference and concludes that since Ruoff explicitly calls the spiny structures nanotubes that such disclosure is sufficient to read on the claimed nanotubes.

21. As per MPEP § 716.07, affidavits or declarations attacking the operability of a patent cited as a reference must rebut the presumption of operability by a preponderance of the evidence. *In re Sasse*, 629 F.2d 675, 207 USPQ 107 (CCPA 1980). In the herein instance, applicant has merely provided an Affidavit stating that the reference does not necessarily disclose that the spiny structures are nanotubes. However, given that the reference explicitly discloses that the spiny structures are nanotubes, the Affidavit fails to rebut the presumption of operability by a preponderance of the evidence. Thus the Ruoff reference is presumed valid and operable. See MPEP § 716.07 and 2121.01.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SAIRA HAIDER whose telephone number is (571)272-3553. The examiner can normally be reached on Monday-Friday from 10am-6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Seidleck can be reached on (571) 272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/James J. Scidleck/
Supervisory Patent Examiner, Art Unit 1796

Saira Haider
Examiner
Art Unit 1796